

Green Monopropellant Propulsion for Small Spacecraft, Phase I Project

SBIR/STTR Programs | Space Technology Mission Directorate (STMD)



ABSTRACT

One of the biggest obstacles preventing the widespread implementation of small satellites is the process of actually getting them into space. Current methods include hitching rides as secondary payloads. Although this initiative has provided significant new launch capacity for CubeSat-class spacecraft, it is not without issues, most specifically limited orbits and orbital lifetime. Many missions need higher orbits to perform their missions; and lower orbits are subject to atmospheric drag that may cause premature reentry. Safe and affordable miniaturized propulsion can overcome these limiting factors and is a high-visibility capability sought by the CubeSat community. Even basic capabilities to push in one direction will allow nanosats to remain in orbit longer, or allow a satellite placed into low-Earth orbit to nudge itself to a higher geostationary orbit. In support of this technological need, Plasma Processes will design, fabricate and demonstrate combustion of a miniaturized propulsion system compatible with non-toxic HAN- and ADN-based green monopropellants for small spacecraft propulsion. The use of advanced, non-toxic propellants can increase mission capabilities including longer mission durations, additional maneuverability, increased scientific payload space, and simplified launch processing. Adding propulsion will also enable de-orbiting of the satellite after completion of the mission.

ANTICIPATED BENEFITS

To NASA funded missions:

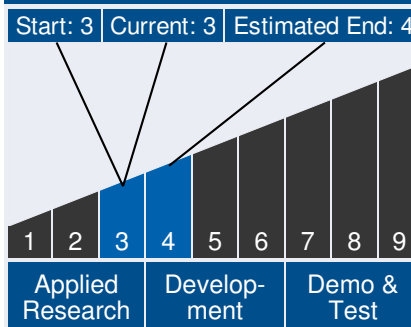
Potential NASA Commercial Applications: Potential NASA Applications include small spacecraft and satellite missions requiring Orbit change & Attitude Control, Precision Propulsion, Formation Flying and Target Reentry. Examples of future mission implementation are next-generation Fast, Affordable, Science and Technology Satellite (FASTSAT); Lunar Flashlight; and NEA Scout.



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Technology Maturity



Management Team

Program Executives:

- Joseph Grant
- Laguduva Kubendran

Program Manager:

- Carlos Torrez

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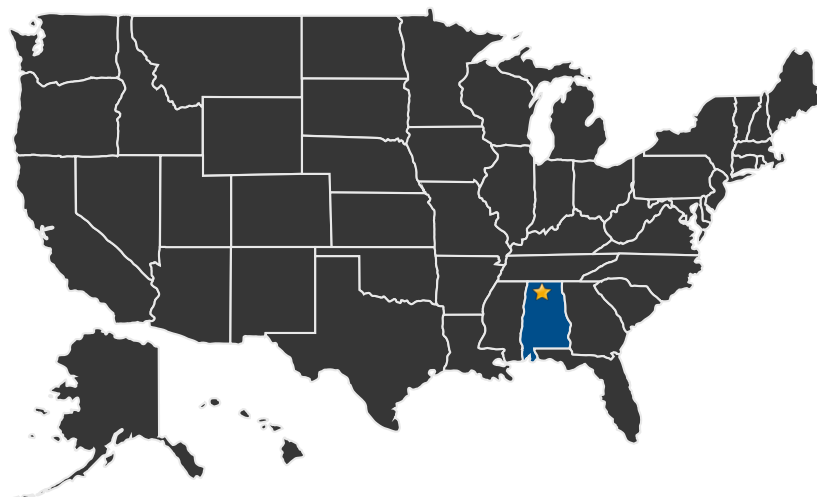
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To the commercial space industry:

Potential Non-NASA Commercial Applications: Commercial application of the technology will provide safe and affordable miniaturized propulsion to support the emerging small, micro- and nano- satellite community; and small satellite constellations to provide global internet and mapping planned by joint ventures including SpaceX/Google and One Web LLC. The technology will also benefit low cost launch providers with an increase in payload demand.

U.S. WORK LOCATIONS AND KEY PARTNERS



■ U.S. States
With Work

★ **Lead Center:**
Marshall Space Flight Center

Other Organizations Performing Work:

- Plasma Processes, LLC (Huntsville, AL)

PROJECT LIBRARY

Management Team (cont.)

Principal Investigator:

- Anatoliy Shchetkovskiy

Technology Areas

Primary Technology Area:

In-Space Propulsion

Technologies (TA 2)

└─ Chemical Propulsion (TA 2.1)

└─ Liquid Storable (TA 2.1.1)

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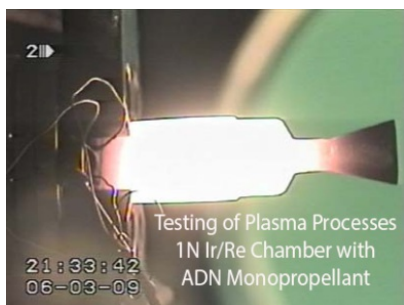
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Presentations

- Briefing Chart
 - (<http://techport.nasa.gov:80/file/23586>)

IMAGE GALLERY



*Green Monopropellant Propulsion for
Small Spacecrafts, Phase I*

DETAILS FOR TECHNOLOGY 1

Technology Title

Green Monopropellant Propulsion for Small Spacecrafts, Phase I

Potential Applications

Potential NASA Applications include small spacecraft and satellite missions requiring Orbit change & Attitude Control, Precision Propulsion, Formation Flying and Target Reentry. Examples of future mission implementation are next-generation Fast, Affordable, Science and Technology Satellite (FASTSAT); Lunar Flashlight; and NEA Scout.